Do patients value a hospital's innovativeness reputation? A multi-method approach to assess the relative importance of innovativeness reputation in patients' hospital choice

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Do Patients Value a Hospital's Innovativeness Reputation? A Multi-Method Approach to Assess the Relative Importance of Innovativeness Reputation in Patients' Hospital Choice

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Hospital Innovativeness Reputation

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ABSTRACT

Innovations in health care are costly and risky, but they also provide the opportunity for hospitals to increase quality of care, to distinguish themselves from competitors and to attract patients. While numerous hospitals strive to increase their innovativeness by adopting a costly innovation leader strategy, the question of whether this actually influences the patient's choice remains unanswered. To understand the role of innovativeness from the patient perspective, this study conceptualizes the construct of innovativeness reputation of hospitals and determines its relevance in patients' hospital choice decisions. In the pretest, we identified six dimensions of innovativeness reputation such as progressive work procedures and value added services. We then used three different quantitative multi-criteria decision-making methods to evaluate the relative importance of innovativeness reputation in patient choice. We collected data from 355 German former patients who had undergone elective non-emergency surgery. Overall, innovativeness reputation accounts for 11.6%-16.8% of the patient decision. Innovativeness reputation has a moderate influence on hospital choice and should be taken into account by managers. Since technical innovations are costly, hospitals should use other means to enhance their innovative image. Strategies such as emphasizing value added services can enable hospitals to increase efficiently their innovativeness reputation.

Keywords: innovativeness reputation, hospital choice, conjoint analysis, analytic hierarchy process

INTRODUCTION

Innovation is a concept with positive connotations and is often associated with organizational success and societal progress. Over the last decades, innovation in the medical context has also proven to be an important driver of increased population health outcomes.[1,2] From the health care providers' point of view, building a reputation for being innovative can be a means to achieve strategic differentiation and a tool to attract patients in times of growing competition.[2]

However, achieving a reputation for being innovative in health care can be challenging. Classic concepts of organizational innovation relate innovativeness to the adoption of innovations, which in the health care context implies high investments. For instance, different studies identified innovation as the main reason for increasing health care expenditures.[3] Furthermore, high degrees of innovativeness imply a certain amount of risk taking.[4] In this uncertain context, health care providers face the complex dilemma of balancing the benefits of innovation (i.e., improved health care quality and differentiation from competitors) against its downside (i.e., increased costs and risks).

In order to provide further insights as to how this dilemma might be solved, we argue for the need to explore the role of hospital innovativeness reputation — the degree to which a hospital is perceived as innovative by its customers — as a strategic asset in patient choice. This aspect has remained unexplored, which is surprising in times of increasing competition, when the notion of hospitals as patient-centered service providers

and the patient as an empowered consumer with deliberate choice ability become salient. Attracting patients can be an important lever for hospital success and should be taken into account when hospital decision makers choose an innovation strategy.

Our paper aims to address current gaps in the literature in two ways. First, organizational innovativeness is a prominent term in health care, but innovativeness has barely been considered from the patients' viewpoint. Therefore, we aim at conceptualizing hospital innovativeness from the patient perspective. To do so, we rely on the literature on organizational reputation and conceive the patient's perception as hospital innovativeness reputation. We explore this concept in a qualitative pretest and identify six dimensions of innovativeness reputation. Second, literature offers very little information about whether a hospital's reputation for being innovative affects the choice of patients. The few previous studies that can be identified often directly ask patients about their preferences and therefore neglect the true nature of these decisions, which are trade-offs between factors. Therefore, we analyze what role innovativeness reputation plays in the multi-criteria decision situation of hospital choice.

The remainder of the manuscript will provide an overview of the literature on hospital innovativeness, organizational reputation and hospital choice, followed by an explanation of the study's methodology. Subsequently the results are presented and discussed. Finally, we provide practical implications and suggestions for further research.

THEORY

Hospital Innovativeness

The construct of hospital innovativeness is often considered to be one-dimensional and exclusively related to the adoption of technical innovations. For example, Tabak & Jain (2000) define hospital innovativeness as top managers' intention to adopt innovations.[5] However, more recent literature has expanded the concept to include the hospital's ability to adopt *and* generate innovations.[6] Salge & Vera (2009) call for a reconceptualization of innovativeness to integrate a hospital's capability to generate both science-based and practice-based innovations internally. Science-based innovativeness relates to clinical innovations by specialists and can be measured, for example, by publication output. Practice-based innovativeness describes internal practice innovations by a variety of staff members and can be measured by means of idea suggestion scores or related indicators.[7] In addition, other researchers have shed light on other forms of innovation generation in hospital that are not related to technical or scientific aspects. For instance, novel routines that improve the orchestration of interactions between the patient and the health care organization can enhance both patient satisfaction and hospital performance.[8] Therefore, different forms of internally generated innovativeness can be a lever to balance the tension between improved health outcomes and costs of health care.

We build on this literature, which takes a broader stance on the meaning of innovativeness within the health care context. Additionally, we further expand the reconceptualization of innovativeness to acknowledge that different actors within the health care system might have different views on the meaning and importance of innovativeness. Consumers observe several organizational activities and organizational characteristics over time to judge whether a firm (i.e., hospital) is innovative. From research on consumer perception of firm innovativeness, we know that consumers' idea of innovativeness goes far beyond the mere availability of technical innovations. For instance, they also consider image factors such as whether the organization is dynamic and forward-looking.[9] For example, from a classic organizational or firm perspective, a company such as Google is innovative because of its generation of (technical) innovations like Google Maps, Google Glasses or Google Translator. From a consumer perspective, Google could also be perceived as innovative because of its different workplace culture, the modern office spaces or the look and feel of its products. Previous research shows that innovativeness from the consumer perspective includes two dimensions: the perceived *novelty* of the firm's activities and the perceived higher *benefit* of these activities compared to previous alternatives.[9,10] Hence, a hospital that appears to be different from the standard and provides benefits compared to competitors should be recognized as being innovative.

However, until now research on consumers' perceived firm innovativeness in general is sparse. More specifically to the health care context, prior literature has looked at hospital innovativeness mainly from the organization's own perspective.[11] Conversely, the patient view on hospital innovativeness is largely missing.

This lack of attention to how patients evaluate the innovativeness of a hospital and whether it influences their hospital choice is a major gap for several reasons. First, as we explain in the section on hospital choice, a hospital's success depends on patients choosing it for treatment. Second, the former understanding of patients as passive recipients of care now shifts to an understanding of patients as active co-creators of value, whose involvement in health services can enhance their own health outcomes.[12] Third, improved information access transforms patients to empowered, knowledgeable consumers of health services.[13] Hence, we argue for the need to apply a multidimensional conceptualization of hospital innovativeness reputation as a representation of the patient perspective.

Organizational Reputation

Organizational reputation signals stakeholders how an organization's products and services perform compared to those of competitors.[14] Stakeholders, such as consumers, derive the reputation from the organization's historical behavior and associations.[15,16] To this end, they rely on information originating from media, the organization itself (e.g., quality reports) or from narratives of others.[14] Hence, when

patients have no previous experience with a hospital, they evaluate its characteristics based on the information they can gather from third parties.[17] It is important to note that organizational reputation is perceptual and constitutes "an understanding of the organization as it exists in the minds of beholders".[15]

Reputation is a key concept for understanding firm success since it affects the organization's relationships with stakeholders.[15] If the reputation is favorable, the organization can attract consumers and can benefit from positive economic and market consequences.[14] Reputation is particularly important to organizations in the health care context. Patients as consumers of hospital services often experience anxiety and stress. Hospitals are perceived as frightening places, where patients undergo treatment and do not enjoy themselves. Patients are therefore more emotional, sensitive and demanding than customers in other consumption settings.[18] Under these conditions, patients are likely to rely on hospitals supported by favorable reputations, where discomfort and stress is expected to be minimized.

In order to further define the nature of a hospital's innovativeness reputation, we rely on the three dimensions of organizational reputation defined by Lange et al. (2011). First, *being known* refers to the generalized awareness, visibility and prominence of the organization. Second, *being known for something* entails the perception that the organization possesses a particular attribute of interest for the stakeholders (e.g., quality). Third, *generalized favorability* includes the overall judgment of the organization as good,

attractive and appropriate.[15] In the context of this article and in line with the conceptualization above, we refer to a hospital as having an innovativeness reputation, if the hospital is visible and favorably known for being innovative.

Hospital Choice

In many health care systems, hospitals have to compete for patients in order to obtain enough revenues and remain economically viable.[19] The choice of a treatment facility is often made in a joint decision making process between the referring physician and the patient. However, as a result of a variety of health care reforms and the increasing salience of patient empowerment, the role of the patient in hospital choice decisions is becoming more dominant. Health care service providers increasingly realize that they have to address the patients' needs and preferences to maintain their patient volume. It is therefore important to understand patients' hospital choice criteria. When actively choosing a hospital, patients rely on available information such as observable hospital characteristics or third-party information.[17,20] Previous research already analyzed a number of potential factors that influence patients' hospital choice. The most important factors are prior experience, recommendations, information on quality indicators, distance and waiting time.[17,20,21,22] However, despite the endeavor of many hospitals to create an innovative image and the tremendous costs associated with an innovation leader strategy, previous studies did not evaluate innovativeness as an antecedent of patients' hospital choice. The approach of this study aims to close this gap by explicitly analyzing

the importance of innovativeness reputation of hospitals compared to other well researched factors in hospital choice.

METHOD

Pretest

Since no common conceptualization of innovativeness reputation in the context of hospitals exists, we conducted a qualitative pretest to explore the consumer's perception of this construct. We interviewed 98 participants (average age 38 years (SD=16), 52% male and 48% female) in a face-to-face situation and asked them to answer the open-ended question: "On the basis of which criteria do you evaluate the innovativeness of a hospital?" We specifically chose this broad and open research question to reflect the lack of conceptualization previous literature provides in terms of consumer perception of innovativeness. Therefore, this pretest is designed to capture the full spectrum of innovativeness reputation regardless of previous concepts of classic non-consumer based firm innovativeness.

In October and November 2014, master-level students from a German university recruited interviewees from their immediate environment and conducted the interviews. The answers were initially written down by the interviewers. Subsequently, the authors conducted a content analysis with inductive coding and generated a category system with six dimensions of the construct hospital innovativeness reputation. These six dimensions of hospital innovativeness reputation and their sub-dimensions consider the adoption and

generation of different types of innovations: science-based product innovations (e.g., 'new technologies and medical devices'), practice-based service innovations (e.g., 'high patient-centeredness'), process innovations (e.g., 'efficient processes') and organizational innovations (e.g., 'high research orientation'). Table 1 presents a detailed overview of the characteristics that define each of the six dimensions, as well as the absolute and relative frequencies with which respondents mentioned them.

Insert Table 1 here

The dimensions and sub-dimensions reflect literature that defines perceived consumer innovativeness as the enduring capability and propensity of firms to generate and adopt something novel and beneficial.[6,7,9,10] The first two dimensions closely reflect traditional conceptualizations of innovativeness related to the provision of high standards for patient treatment and of complementary patient services. The remaining four dimensions show that patients' evaluation of innovativeness reputation is broader but can be consistently related to the concepts of novelty and additional benefits. For example, a 'pleasant architecture', which includes among others a contemporary interior design and a pleasant ambience, is perceived as innovative by consumers because hospitals often lack these features (i.e., novelty) and it provides additional benefits such as being comforting and calming or having a positive influence on patients' mood (i.e., benefit). Moreover, the dimension 'efficient organization' indicates that, for patients, innovative hospitals are not

only technological forerunners in medical methods but also in technological and organizational management tools (e.g., digital data transfer or critical incident reporting system). Such innovative management tools are not yet a standard in hospitals from the patient perspective (i.e., novelty), but can result in better patient outcomes. For example, the digital interconnectedness between infirmaries in a hospital avoids that the patients have to repeatedly explain their symptoms and medical history to different physicians and ensures that no relevant diagnostic by a physician is unavailable to a subsequent physician in the treatment procedure of the patient (i.e., benefit). Finally, the dimensions 'competent staff' and 'innovative stakeholder communication' might not be an innovation in the traditional understanding based on the firm perspective. However, from the patient's perspective, an extra attention to the appearance of staff members and information access, among others, might be unusual for hospitals (i.e., novelty) and perceived as indicator for professionalism and consequently good service (i.e., benefit).

Methodological Approach

We investigated the relative importance of innovativeness reputation in patients' hospital choices with quantitative multi-criteria decision-making methods. These methods can be classified as compositional or decompositional. Analytic hierarchy process (AHP) and conjoint analysis (CA) are respectively popular methods within these two categories and broadly applied in decision analysis. Compositional methods ask questions about attributes to estimate preferences, while decompositional methods ask for

general judgments on multi-attribute alternatives.[23] AHP is less complex to apply in practice and performs better concerning validity indicators, whereas CA uses a more realistic setting.[23]

In addition, each participant directly reported their preferences on a constant sum scale. Because the results of the direct and indirect measurement of preferences may differ,[22] the use of AHP, CA and constant sum scale allows our study to uncover and discuss such differences.

Participants

We recruited participants with the help of master-level students from a German university in December 2014 and January 2015. We trained the students in data collection methods and provided quota plans to ensure equal distribution between genders and a sufficient amount of study participants in different age groups.

To ensure that the participants were able to reflect on a real context, they had to have undergone an elective non-emergency surgery within the last two years and made a deliberate hospital choice without limitations. The setting is particularly suitable for this study since the German health care system generally allows freedom of hospital choice. Each of the 80 students had to recruit at least four participants who fulfilled this requirement, through snowball sampling.

Quantitative Multi-Criteria Decision Making

Hospital Choice Attributes

To determine the relative importance of innovativeness reputation, we provided the participants with a realistic choice situation where we selected hospital attributes that previous research found to be most relevant. We limited the number of attributes to five, which has been argued to be the maximum number that patients can effectively process.[20] To make the results comparable, we included the same five attributes in the different methodological approaches. Based on previous literature,[20,21,22] we selected the attributes *distance, recommendation* (from physicians or family), *waiting time*, and *quality information* in addition to *innovativeness* (i.e., the term we used in front of participants to refer to innovativeness reputation,). Other relevant attributes reported in the literature, such as shared decision making, are included in our conceptualization of innovativeness reputation of hospitals and were not considered separately to minimize inter-attribute correlation.

We followed the approach of Leister & Stausberg (2007) and excluded prior hospital experience.[24] Previous research has shown that prior experience is the most relevant choice criterion[20,21] and would dominate all other criteria. Excluding experience is aligned with our aim of understanding the importance of attributes where no experiential knowledge is available and the choice is based on direct hospital information or third-party information.

For *recommendation* and *innovativeness,* we used a binary measure that reflects a high or low value (i.e., recommended vs. not recommended, high vs. low innovativeness). For the attributes *distance*, *waiting time* and *quality information*, we determined threshold values. *Distance* values (i.e., near=30 minutes vs. far=1.5 hours with means of transport) were determined based on the average distance to the closest hospital in Germany (3-9 km)[25] and usual travel times to them in an urban area (<20 minutes for 98% of the population). Similarly, values for *waiting time* (i.e., short=2 months vs. long=6 months) for non-emergency surgery procedures were based on averages. The shortest mean waiting times in OECD countries are below 45 days and the longest mean waiting times are five months.[26] We used infection rates as proxy for *quality information*[21] (i.e., infection rate low=1.8% vs. high=4.7%) as nosocomial infection rates are among the most important choice criteria.[27] The average prevalence of hospital-associated infections is 5% for surgery in Germany and less than 1% for hip and knee surgery. [28,29]

Patient characteristics and socio-demographic variables can also influence the relative importance of attributes.[22] Therefore, we included sex, age, education and health status as control variables. We distinguished three age groups (<26 years, 26 to 48 years and >48 years), three education levels (intermediate, A-Level and academic degree) and we measured current health status with a five-point Likert scale ranging from 1…very poor to 5…very good. Participants received a detailed explanation of all choice criteria to ensure a similar understanding of the constructs across patients (see Appendix for study

procedures). For example, innovativeness was described according to the six dimensions revealed in the pretest.

Analytic Hierarchy Process (AHP)

AHP is a widespread method in the health care context to measure patient preferences.[1] The approach comprises four general steps: (1) problem modeling as hierarchy, (2) attribute comparison, (3) priority calculation, and (4) priority synthesis.[30]

In this study, the five attributes measured belong to the same hierarchy level with the overarching goal of choosing the preferred hospital (step 1). Respondents compared paired attributes in a face-to-face interview or in an online survey and rated their preferred attribute in relation to the second attribute on a 9-point scale ranging from 1…equal importance to 9…extremely higher importance (step 2).[31] We organized pairwise attribute comparisons of each participant in an upper triangular matrix, we completed the matrix with reciprocals and we calculated the vector of priorities for each respondent separately by solving for the principal eigenvector.[31] We obtained the priority vector by an iterative matrix multiplication method (step 3).[30,31]

We used the geometric mean for the aggregation of individual priorities (AIP). In contrast to the aggregation of individual judgment matrices in one combined group matrix (AIJ), AIP considers each individual separately and does not violate the Pareto Principle (step 4).[32] Finally, because humans often judge inconsistently and may violate the

principle of transitivity, AHP suggests a consistency check with a standardized consistency ratio (CR).[30,31]

However, since a modicum of inconsistency reflects a natural judgment and AHP allows for inconsistency,[33] we did not exclude inconsistent data, but proved by group comparisons that no significant differences in priority weights between consistent and inconsistent data exists. In addition to AIP, we calculated the AIJ matrix. Under the premise of a sufficiently large data set (for a 5x5 matrix, the threshold is 25), the AIJ matrix is considered to be consistent regardless of the individual values of the consistency index when using the geometric mean.[34] We show that priority values resulting from AIP and AIJ do not substantially differ and therefore ensure consistency of our aggregated results with both approaches.

Conjoint Analysis (CA)

CA realistically simulates trade-off decisions among multi-attribute alternatives.[35] We used traditional CA because it is time efficient, easily applicable and equally valid to other CA methods.[36] The traditional CA in this study proceeded in four steps: (1) criteria identification, (2) stimuli generation, (3) stimuli ranking, and (4) priority calculation.

After selecting five relevant hospital attributes and their corresponding two levels (step 1), we created stimuli (i.e., alternative hospitals) consisting of several attribute level combinations. Since including all possible attribute level combinations would lead to participant information overload (2^5=32 stimuli), we generated a fractional factorial

design using SPSS's orthogonal design feature[35]. This type of design provides a subset of stimuli (step 2) that is large enough to estimate all parameters and ensures attribute balance and orthogonality of levels. For this case with five attributes and two levels per attribute, SPSS generated eight stimuli. Each participant subsequently rank-ordered the stimuli from one to eight in face-to-face interviews (step 3). Stimuli were displayed on separate cards and the order of the cards was randomized.

For calculating relative attribute importance, we used metric model estimation. We used SPSS 22, which bases on ordinary least square (OLS) estimation, for calculating a common CA over all patients (step 4). We used both joint CA and individual aggregation average to explore any potential differences. Calculating correlations between the actual and predicted ranks using Kendall's tau ensured accuracy of the results.[35]

Group and Method Differences

We decided to conduct non-parametric tests to calculate differences (Δ) between the relative importance of the attributes for different subgroups of our data, because of violation of the normality requirement (i.e., Kolmogorov-Smirnov test $p<.001$). For independent samples, we used Mann-Whitney-U tests (two subgroups) and Kruskal-Wallis tests (more than two subgroups). For paired samples, we used the Wilcoxon test. Since some scholars argue for the robustness of parametric tests such as ANOVA and (paired) t-tests, we compared the results of the non-parametric and parametric tests. We

found only three significant differences in the 85 comparisons shown in Table 4 and Table 5, indicating that the results are robust.

RESULTS

Quantitative Multi-Criteria Decision Making

The quantitative study included 355 participants. Table 2 offers an overview of the demographic characteristics of the participants of the study. All chi-squared tests revealed no significant difference between AHP and CA participants in terms of age, gender, educational level and health status.

Insert Table 2 here

Attribute importance

The relative importance of each of the attributes calculated by means of the two indirect methods (CA and AHP) and the direct method (constant sum scale) are shown in Table 3.

For AIP, the results show that the most important attributes are *recommendation* with a relative importance of 30.6% (27.6-33.8) and *quality information* with a relative importance of 30.0% (27.0-33.4). *Innovativeness* is the third in the rank with 16.8% (14.8-19.0). *Waiting time* and *distance* are fourth and fifth in rank with a relative importance of 12.3% (11.1-13.7) and 10.3% (9.0-11.8) respectively. Calculations are based on both consistent (CR<0.1) and inconsistent (CR>0.1) data since the Mann-Whitney-U tests

revealed no differences in the relative importance of any of the attributes between groups of consistent respondents and those with inconsistent preferences. Likewise, the results do not differ between the face-to-face and online respondents (31.8% of the participants). The priority ranking also holds true for the aggregation of individual judgments (AIJ) (CR=.002), with only marginal differences in the relative importance, as reported in the fourth column of Table 3.

Insert Table 3 here

The analysis of joint CA data assigns the highest relative importance to *quality information* (31.8%) followed by *recommendation* (24.0%), *distance* (17.5%) and *waiting time* (15.1%). According to this method, *innovativeness* is the least important attribute (11.6%). Similarly to AHP, individually aggregated averages and joint CA calculations result in the same ranking despite minimal differences in the relative importance of each attribute.

As for the constant sum scale, the ranking of attribute importance is as follows: *recommendation* (25.0%), *quality information* (24.4%), *distance* (18.3%), *waiting time* (16.9%) and *innovativeness* (15.4%).

Group and Method Differences

Group differences. We report differences across groups and methods in Table 4. The results show no significant differences in attribute importance across different age

groups, educational levels and health status. Significant differences between male and female respondents were found for *waiting time*, which was more important for men than women (mean male=16.1%, mean female=11.5%, P<.001).

Method differences. *AHP vs. CA.* The results in the last two rows of Table 4 show the differences in attribute importance between respondents who participated in AHP and CA. The attribute importance reported by AHP and CA was significantly different for all attributes except *quality information*. AHP respondents assigned significantly higher importance to *recommendation* (mean AHP=28.6%, mean CA=22.4%, P<.001) and *innovativeness* (mean AHP=17.4%, mean CA=12.6%, P<.001). CA respondents assigned higher importance to *distance* (mean AHP=12.7%, mean CA=17.5%, P<.001) and *waiting time* (mean AHP=12.3%, mean CA=15.6%, P=.011).

Insert Table 4 here

Direct vs. indirect. In Table 5 we report the paired sample comparisons of attribute importance for direct and indirect methods. When taking into account the entire sample (i.e., AHP and CA respondents) we find that direct and indirect methods result in different importance levels for the attributes *distance* (mean indirect=15.1%, mean direct=18.3%, P<.001), *waiting time* (mean indirect=14.0%, mean direct=16.9%, P<.001) and *quality information* (mean indirect=30.3%, mean direct=24.4%, P<.001).

Insert Table 5 here

DISCUSSION

This research provides three distinct contributions to the field of health care services management. First, we conceptualize the patients' perception of hospital innovativeness (i.e., innovativeness reputation). Second, we determine the relative importance of innovativeness reputation as a driver of patients' hospital choice decisions. Third, we foster the discussion on multi-criteria decision making methods by providing new evidence on potential biases of AHP and CA.

Research on organizational innovativeness, as the capability of a firm to create and use new products and services, has a long-standing tradition in innovation research.[11] However, research has mainly focused on the organizations' internal perspective and on the hospitals' adoption of technological or administrative innovations.[5,6] The consumers' perspective and external perceptions of the hospitals' innovativeness (i.e., innovativeness reputation) are often neglected. While considering innovativeness from the internal perspective is especially relevant when evaluating the hospitals' performance outcomes, the innovativeness reputation is important to attract new patients and increase sales. We found that participants associate a hospital's innovativeness reputation with six different dimensions.

Interestingly, the identified dimensions include the four dimensions of the consumer perception of health service quality.[38] For example, 'progressive work

procedures' reflect their technical quality dimension, 'pleasant architecture' their environment quality dimension, 'efficient organization' their administrative quality dimension and 'competent staff' their interpersonal quality dimension. Hence, the perception of quality constitutes a major aspect in the innovativeness reputation of hospitals as well. However, the conceptualization of innovativeness reputation additionally includes 'value added services' and 'innovative stakeholder communication' that seem to be unique to this construct. These findings reveal two aspects that are relevant to patients but have not been explored before. Value added services provide a fruitful ground for differentiation among health care competitors. While competing organizations mostly focus on the core dimensions of health service quality, value added services such as free Wi-Fi, fitness and wellness are ways to differentiate in a close competition at a comparably low-cost. Innovative stakeholder communication in the information age is the forefront of consumer relations and an important aspect of creating and communicating reputation.

Furthermore, these two new aspects support our argument that innovativeness, as perceived by the patient, certainly goes beyond the technical aspects usually considered as organizational innovativeness, but also beyond broader conceptualizations and related constructs such as perceived service quality. In order to achieve a reputation for being innovative, hospitals must not only strive for quality, but also for additional novel approaches to service provision. Although the six dimensions might a priori not directly

correlate with traditional understandings of organizational innovativeness, we have shown that, in line with literature on consumers' perception of innovativeness[9,10], they all reflect novelty and provide benefits to patients.

By using multiple multi-criteria decision making methods, we show that the so far disregarded role of innovativeness reputation is not to be neglected. Depending on the method of measurement, hospital innovativeness reputation accounts for 11.6% to 16.8% of the choice. For patients, it is as important as distance and waiting time, but not as important as recommendation and quality information. A holistic concept that aims to explain patients' hospital choice behavior should therefore include innovativeness reputation as a determining construct. Although conventional wisdom and prior research on innovation adoption[37] assumes that the importance of innovativeness is different across different consumer groups, this study demonstrates that demographic variables (age, gender, educational level and health status) are no suitable discriminators. Additionally, this research contributes to understanding methodological differences when exploring complex decisions. Comparing stated versus revealed preferences, this study shows that directly stated preferences overestimate the importance of distance and waiting time and, in turn, underestimate the importance of quality information. Accordingly, participants are probably not entirely aware of how their risk aversion influences the outcome in an actual choice setting.

Through the application of AHP (compositional) and CA (decompositional), we revealed structural variances in the evaluation of attributes. We find that the compositional method AHP relatively overestimates subjective criteria (i.e., recommendation, innovativeness) and the decompositional method CA relatively overestimates objective criteria (i.e., distance and waiting time). Following the thoughts of Kahneman (2003), this might be due to the large amount of information and the bounded rationality of decision-makers who face such situations.[39] The cognitive burden is much higher in the realistic decision situation of CA[23] than in the more abstract attribute comparison of AHP. The complex decision situation of CA prompts decision-makers to reduce the complexity by putting more emphasis on objective, measurable attributes. We expect the size of this effect to depend on the number of attributes: the more attributes (and hence the more complex the choice situation), the more will results of AHP and CA diverge.

Nevertheless, we consider the results regarding innovativeness reputation to be reliable concerning the general tendency of its importance. Across all three methods (i.e., AHP, CA and constant sum scale) recommendation and quality information rank number one or two with a share of each far above 20%. Innovativeness, waiting time and quality information always rank third, fourth or fifth with shares below 20% but above 10%. Hence, differences in shares across the three methods for each criterion are not greater than 5%. Through the use of several methods we provide a range for the importance of

innovativeness reputation rather than a concrete number. This is necessary, due to the imperfection of each available method. Additional research is needed to determine the cause of this methodological variance.

PRACTICAL IMPLICATIONS

Although adopting and generating technological innovations influences hospital reputation from the patient perspective, the construct is much more multifaceted. Other important components of hospital innovativeness reputation are for example value added services (see Figure 1). Therefore, complementing core medical services with value added services can be effective in creating an innovative image and attracting patients. This seems especially important in situations, where we see a dense and homogenous competition among health care providers. Value added services such as free Wi-Fi, fitness or wellness facilities could be an important factor for differentiation from competitors that are perceived as equal in terms of their core medical service quality. In general, hospitals should consider all six hospital innovativeness reputation dimensions to build an innovative image.

The finding that innovative reputation has a moderate influence on hospital choice (see Figure 1) has important managerial implications. Considering the limited resources of hospitals, the decision to invest in building a reputation for being innovative might provide a competitive advantage to the hospital but needs to be well reasoned. For

instance, investing in quality and in maintaining a network of trustworthy referring physicians seems to be more important for attracting patients. However, our study points to a series of services or measures that hospitals might implement at comparatively low investments and communicate externally to enhance their innovative reputation. For example, providing some of the value added services in Table 1 or minding the details that increase the pleasantness of the architecture does not require large investments in time and money. Nevertheless, these might play a role in building the hospital's reputation for being innovative and hence yield significant returns on investment. Especially in the study context of Germany, but also in other western countries, ongoing challenges that lead to increasing health care costs require efficient hospital management and organization and effective resource allocation. Our results offer hospital managers a basis to compare investments in order to determine the most convenient strategies.

Previous research[38] found a significant impact of four health service quality dimensions on service satisfaction and behavioral intentions of patients. As already discussed, these dimensions overlap with four of our innovative hospital reputation dimensions. Therefore, we also expect that the dimensions to influence patients' service satisfaction and enhance the likelihood that patients return for the next hospital stay. However, additional research would be needed to confirm the consequences of high innovative reputation on patient satisfaction and intentions.

Insert Figure 1 here

LIMITATIONS AND FUTURE RESEARCH

This study is not without limitations. First, our approach assumes an active choice decision. However, in a real decision context, patients might have a limited ability or willingness to use the available information or face restrictions of the health insurance system.[22] Nevertheless, as the notion of the empowered patient becomes more salient in current health care reforms, providing patients with information is of high relevance.

Second, we cannot exclude the possibility that other attributes such as ownership or hospital size[17] might be important in the context of hospital choice as well. However, we included the most relevant attributes and demonstrate that innovativeness does not fall behind.

Third, we did not find significant differences in the importance of hospital choice attributes for different groups of patients. However, the importance of different hospital innovativeness reputation dimensions could differ between groups of patients and should be investigated by future research. For example, patients that undergo routine interventions might not value competent staff as highly as patients with complex surgery procedures that require specific expertise and trust in the physician. Hence, future research should measure the importance of different innovative hospital reputation dimensions for different patient groups.

Fourth, the innovativeness dimensions are not necessarily as independent of other hospital attributes as assumed a priori. For example, progressive work procedures as hospital innovativeness reputation dimension could lower infection rates and therefore, relate to the attribute quality information. Moreover, effective organization as hospital innovativeness reputation dimension could reduce waiting times or in turn low waiting times could be a driver of hospital innovativeness reputation. However, such organizational dependencies are not primarily in the focus of the patients' perspective. Fifth, AHP and CA both rely on hypothetical hospital settings. Hence, we did not investigate actual decisions. Therefore, future research could either retrospectively reveal choice determinants in actual hospital decisions or monitor and accompany in real time actual patient decisions.

Sixth, we excluded prior experiences as a choice criteria in order to focus on the patients' evaluation of a hospital's reputation. Hence, the findings are only valid for patients who have not attended a hospital for surgery before. Further studies should include prior experiences as a hospital choice attribute in order to determine the impact of hospital innovativeness reputation on hospital choice in actual patient decisions.

Finally, we uncovered differences in attribute importance for different methods. Future research should systematically study why the discrepancies across methods emerge and which differences systematically persist.

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TABLES

Table 1

Dimensions of Hospital Innovativeness Reputation

	Dimension	Definition	2nd order codes	1st order codes (related patient examples)	Frequency n (%)
1.	Progressive work procedures	High, up-to-date standards for patient treatment	Modern and broad treatment methods	Minimally invasive surgery, social workers, conventional medicine and alternative medicine, psychological support, health counseling	87 (24.4%)
			High research orientation	Presence of medical students and researchers, publication output, patents, R&D expenditures, research projects	
			New technologies and medical devices	Latest surgery material and MRT devices, use of tablets for flying visits, digital gait analysis	
			Large interdisciplinary network	Cooperation with health insurance firms, GPs and other hospitals, consulting of external specialists, many specialized centers (e.g., rehab, medical service centers) in one hospital	
			High quality standards	24-hour health care supply, high standards of hygiene, aftercare and convalescence in hospital, minimal misdiagnoses	
2.	Value added services	Non-treatment-relevant services and facilities to enhance patient comfort	Comfortable stay and entertainment options	Free Wi-Fi and TV, fitness and wellness facilities, evening events, (baggage) transportation services, choir and reading circles, accommodations for visitors, flexible visiting hours, healthy and vegetarian meals	69 (19.4%)
			Additional treatment services	Small number of beds in one room, seating facilities and recreation rooms, no bed placements in corridors after surgery	

3.	Pleasant architecture	Non-treatment-relevant design, ambience and infrastructure aspects	Latest technical equipment	Multimedia equipment, medication and food transport robots	61 (17.1%)
			Contemporary interior design	Intuitive corridor guidance, modern adjustable beds, transportable furniture, energy efficient architecture, large rooms	
			Pleasant ambience	No hospital ambience (dull corridors and typical hospital smell), modern staff dress code, daylight lamps, music	
			Nice surroundings	Parks, good transport connection, good location in the city, calm location	
4.	Efficient organization	Efficient internal organization of processes to support treatment	Modern IT	Digital data transfer and automatic administration systems, central information and communication technology, data security, information synchronization, short communication paths, digital patient file	55 (15.4%)
			Efficient processes	Interconnectedness between infirmaries, short waiting times, process-oriented spatial division, case management, clinical treatment pathways, supplier cooperation (e.g., laundry), flexibility and no formalization, central diagnosis, critical incident reporting system	
5.	Competent staff	Staff characteristics and behavior that enhance patient trust and comfort	High expertise	Up-to-date knowledge and continuous training, good qualifications, high degree of specialization, transparent communication about medication and treatment procedures, multiple informative dialogues	50 (14.0%)
			Neat appearance	Language expression, young age, pleasantness, motivated staff	
			High patient-centeredness	Shared-decision making, patient-as-customer attitude, consideration of patient wishes, equal treatment independent of insurance type, human-centeredness, personal and trustful relationship	

6.	Innovative stakeholder communication	Hospital's efforts to communicate transparently with its environment	Good reputation	Awards and certificates, recommendations from friends and GP, high reputation of staff and hospital, good hospital rankings	34 (9.6%)
			Enough information provision	Publication of research results for the public, open house days and information events, information material about hospital characteristics (e.g., number of operations)	
			Easy information access	Social media presence, modern and well-structured webpage, image movie, interactive location map	

Table 2

Demographic Characteristics of the Study Samples

	AHP	CA	Difference (χ^2-Test)	Constant Sum Scale (Total)
Sample Size	176	179		355
Age [Mean (SD)]	38 (19)	40 (19)	$\chi^2 = 4.106$ (P = 0.13)	39 (19)
<26	67 (38.1%)	52 (29.1%)		119 (33.5%)
26-48	59 (33.5%)	61 (34.1%)		120 (33.8%)
>48	50 (28.4%)	66 (36.9%)		116 (32.7%)
Gender			$\chi^2 = 1.045$ (P = 0.31)	
Male	99 (56.3%)	91 (50.8%)		190 (53.5%)
Female	77 (43.7%)	88 (49.2%)		165 (46.5%)
Educational Level			$\chi^2 = 3.222$ (P = 0.20)	
Intermediate	48 (27.3%)	52 (29.1%)		100 (28.2%)
A-Level	46 (26.1%)	31 (17.3%)		77 (21.7%)
Academic Degree	82 (46.6%)	88 (49.2%)		170 (47.9%)
Missing Values	-	8 (4.5%)		8 (2.3%)
Health Status [Mean (SD)]	3.81 (1.028)	3.91 (.958)	$\chi^2 = 4.682$ (P = 0.32)	3.86 (.993)
1…very poor & 2…poor	20 (11.4%)	14 (7.8%)		34 (9.6%)
3…fair	30 (17.1%)	40 (22.4%)		70 (19.7%)
4…good	80 (45.5%)	71 (39.7%)		151 (42.5%)
5…very good	44 (25.0%)	54 (30.2%)		98 (27.6%)
Missing Values	2 (1.1%)	-		2 (0.6%)

Note. SD = Standard Deviation. AHP = Analytic Hierarchy Process. CA = Conjoint Analysis.

Table 3

Relative Importance of Hospital Choice Attributes

	AHP[a]						CA			Constant Sum Scale (Rank) [CI%]
	AIP (Rank) [CI%][b]	AIJ (Rank)	Difference	Consistent (Rank) [CI%] n = 57	Inconsistent (Rank) [CI%] n = 119	Difference[c]	Individual Aggregation (Rank) [CI%]	Joint CA (Rank)	Difference	
Hospital Choice Attribute										
Distance	10.3% (**5.**) [9.0-11.8]	10.2% (**5.**)	Δ -0.1%	11.2% (5.) [8.86-14.11]	9.9% (5.) [8.29-11.75]	Δ -1.3% (P = 0.22)	17.5% (**3.**) [15.1-19.8]	17.5% (**3.**)	Δ +0.0%	18.3% (**3.**) [16.9-19.7]
Recommend-ation	30.6% (**1.**) [27.6-33.8]	30.9% (**1.**)	Δ +0.3%	34.1% (1.) [28.50-40.78]	28.9% (2.) [25.54-32.73]	Δ -5.1% (P = 0.06)	22.4% (**2.**) [19.8-25.0]	24.0% (**2.**)	Δ +1.6%	25.0% (**1.**) [23.5-26.4]
Waiting Time	12.3% (**4.**) [11.1-13.7]	12.3% (**4.**)	Δ -0.1%	12.5% (4.) [10.46-14.95]	12.2% (4.) [10.68-14.00]	Δ -0.3% (P = 0.87)	15.6% (**4.**) [13.7-17.6]	15.1% (**4.**)	Δ -0.5%	16.9% (**4.**) [15.9-17.8]
Quality Information	30.0% (**2.**) [27.0-33.4]	30.1% (**2.**)	Δ +0.1%	27.2% (2.) [22.22-33.36]	31.4% (1.) [27.64-35.58]	Δ +4.1% (P = 0.42)	31.9% (**1.**) [29.0-34.8]	31.8% (**1.**)	Δ -0.1%	24.4% (**2.**) [22.99-25.8]
Innovativeness	16.8% (**3.**) [14.8-19.0]	16.5% (**3.**)	Δ -0.3%	15.0% (3.) [12.47-18.12]	17.6% (3.) [15.00-20.72]	Δ +2.6% (P = 0.18)	12.6% (**5.**) [10.6-14.5]	11.6% (**5.**)	Δ -1.0%	15.5% (**5.**) [14.5-16.5]
Quality Indicator										
CR	-	0.002		< 0.1	> 0.1					
Kendall's Tau							1.00***	1.00***		

Note. AHP = Analytic Hierarchy Process. CA = Conjoint Analysis. CI = Confidence Interval.

[a] Standardized geometric means.

[b] 95% Confidence Interval. For AHP, CI is based on geometric mean. For CA as well as constant sum scale, CI is based on arithmetic mean.

[c] Non-parametric Mann-Whitney-U test. No ANOVA as variance homogeneity is violated for innovativeness. The robust Welch test, which can be used when variance homogeneity is violated, shows also no significant differences (P = 0.70, P = 0.05, P = 0.81, P = 0.39, P = 0.05).

Table 4

Group Comparisons within Indirect Methods with Non-Parametric Tests

Control Variable	Indirect Method (individual AHP and CA combined) Mean (SD)				
	Distance	Recommend-ation	Waiting Time	Quality Information	Innovative-ness
Age					
<26	14.1 (15.0)	25.4 (16.5)	14.3 (11.5)	30.7 (17.2)	15.6 (14.5)
26-48	15.9 (15.8)	27.5 (16.6)	14.0 (10.5)	27.2 (17.3)	15.4 (13.8)
>48	15.4 (14.9)	23.4 (17.4)	13.7 (12.5)	33.0 (19.2)	14.5 (12.9)
Gender					
Male	14.3 (14.9)	25.3 (17.4)	**16.1 (12.4)*** **	28.6 (17.5)	15.8 (14.2)
Female	16.1 (15.6)	25.7 (16.3)	**11.5 (9.9)*** **	32.2 (18.5)	14.4 (13.2)
Educational Level					
Intermediate	16.4 (16.3)	25.6 (16.5)	12.7 (11.2)	30.1 (18.8)	15.2 (13.3)
A-Level	14.7 (15.8)	27.5 (16.3)	13.3 (11.7)	28.7 (18.5)	15.9 (15.2)
Academic Degree	14.7 (14.5)	25.6 (17.0)	14.6 (11.6)	30.0 (17.0)	15.1 (13.4)
Health Status					
1…very poor & 2…poor	15.4 (17.9)	22.6 (18.8)	15.1 (15.2)	29.4 (18.6)	17.6 (15.2)
3…fair	16.6 (16.3)	28.2 (17.5)	14.2 (10.1)	25.8 (18.2)	15.2 (15.3)
4…good	14.1 (13.9)	25.6 (16.2)	13.6 (10.7)	31.4 (17.4)	15.2 (13.8)
5…very good	15.7 (15.7)	24.2 (16.7)	13.8 (12.0)	32.4 (18.3)	13.9 (12.0)
Method					
AHP	**12.7 (14.1)*** **	**28.6 (15.4)*** **	**12.3 (9.5)***	28.6 (16.3)	**17.7 (13.8)*** **
CA	**17.5 (15.9)*** **	**22.4 (17.6)*** **	**15.6 (13.0)***	31.9 (19.5)	**12.6 (13.2)*** **

Note. All numbers are in %. SD = Standard Deviation. AHP = Analytic Hierarchy Process. CA = Conjoint Analysis.

*** P < 0.001

** P < 0.01

* P < 0.05

Table 5

Comparison between Direct and Indirect Methods with Wilcoxon-Test

	Indirect Method Mean (SD)	**Direct Method Mean (SD)**
Total		
n = 355		
Distance	**15.1 (15.2)*** **	**18.3 (13.5)*** **
Recommendation	25.5 (16.9)	25.0 (13.8)
Waiting Time	**14.0 (11.5)*** **	**16.9 (9.5)*** **
Quality Information	**30.3 (18.0)*** **	**24.4 (13.9)*** **
Innovativeness	15.1 (13.7)	15.5 (9.8)
AHP		
n = 176		
Distance	**12.7 (14.1)*** **	**17.4 (13.4)*** **
Recommendation	**28.6 (15.5)***	**26.6 (14.6)***
Waiting Time	**12.3 (9.5)*** **	**15.8 (9.5)*** **
Quality Information	**28.6 (16.3)*** **	**24.3 (14.2)*** **
Innovativeness	17.7 (13.8)	16.0 (10.1)
CA		
n = 179		
Distance	**17.5 (15.9)***	**19.1 (13.6)***
Recommendation	22.4 (17.6)	23.5 (12.9)
Waiting Time	**15.6 (13.0)***	**17.9 (9.5)***
Quality Information	**31.9 (19.5)*** **	**24.4 (13.7)*** **
Innovativeness	**12.6 (13.2)*** **	**15.1 (9.6)*** **

Note. All numbers are in %. SD = Standard Deviation.

AHP = Analytic Hierarchy Process. CA = Conjoint Analysis.

*** P < 0.001

** P < 0.01

* P < 0.05

FIGURES

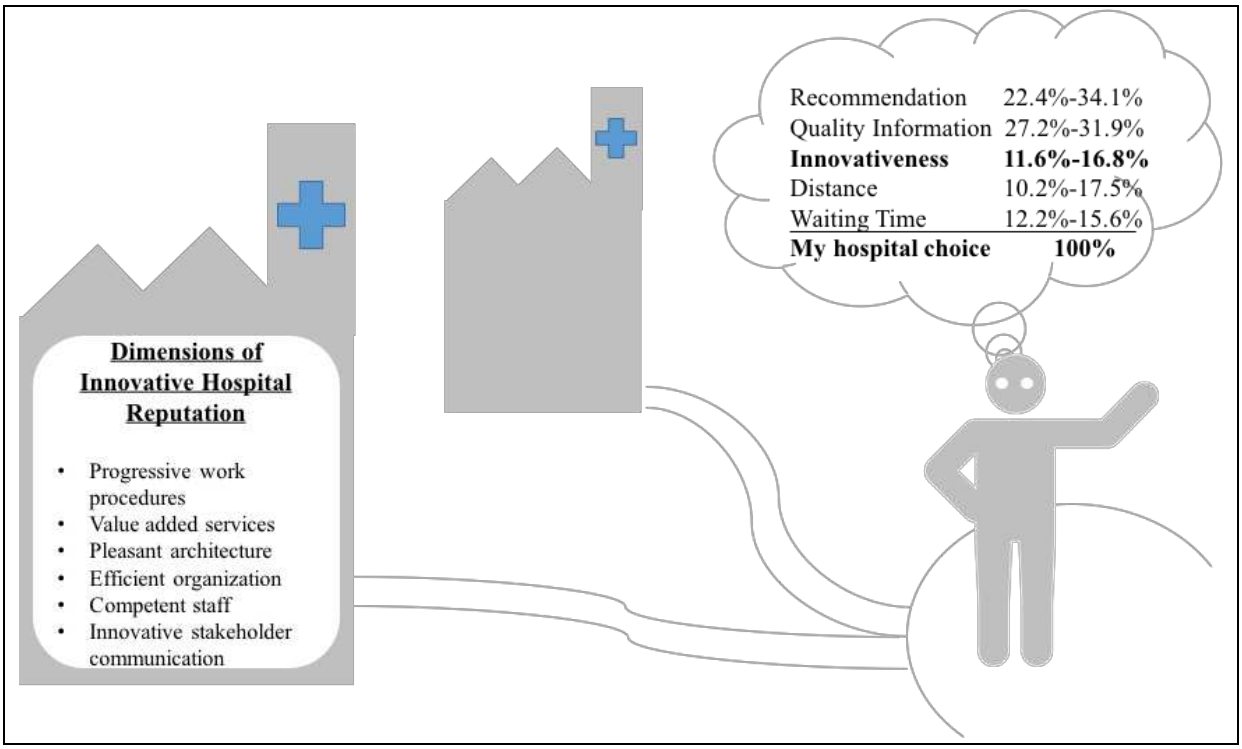

Figure 1 *Dimensions of Innovativeness Reputation and Hospital Choice*

APPENDIX

Survey Instrument (English Translation, Original in German)

Master students participating in the data collection process were trained to conduct interviews and survey according to the instruments displayed below. Freedom was granted in minor aspects such as the choice of introductory sentences, the order of the pairwise comparisons in AHP or the display of the information on the stimuli cards for conjoint analysis. In addition, for the quantitative data collection students were allowed to use an online survey or a face-to-face procedure. This freedom within pre-defined survey elements ensures a natural variation within the data collection procedure and prevents bias. The authors did not receive the full names or any other identifiers of the participants, which ensures maximum anonymity.

For all participants: oral or written explanation of the five choice criteria

- Distance: how far the next hospital is in terms of public transport time
- Recommendation: recommended by the general practitioner or family and friends
- Waiting time: waiting time for surgery after being placed on the waiting list
- Quality information: comparative information about the infection rate
- Innovativeness: how innovative is the hospital in terms of progressive work procedures, value added services, pleasant architecture, efficient organization, competent staff and innovative stakeholder communication

Each participant either performed Analytic Hierarchy Process (AHP) or Conjoint Analysis (CA):

Analytic Hierarchy Process (AHP)

Rating of the following 10 pairwise comparisons according to the scale by Saaty 1987 (1… equal importance, 3… Moderate importance of one over another, 5… Essential or strong importance, 7… Very strong importance, 9… Extreme importance). The order of the combination varies and the left and the right side can be reversed.

Distance	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Recommend.
Distance	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Waiting time
Distance	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Quality information
Distance	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Innovativeness
Recommend.	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Waiting time
Recommend.	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Quality information
Recommend.	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Innovativeness
Waiting time	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Quality information
Waiting time	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Innovativeness
Quality information	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Waiting time

Conjoint Analysis (CA)

Display of the two criteria levels for each criterion.

Criterion	Level 1	Level 2

Distance	Close < 30 minutes with public transport	Far > 1.5 hours with public transport
Recommendation	Recommended	Not recommended
Waiting time	Short < 2 month	Long > 6 month
Quality information	Infection rate low < 1.8 %	Infection rate high > 4.7 %
Innovativeness	High	Low

According to the orthogonal design, eight stimuli cards with the following information were created. The participants were asked to rank these cards according to their preference (1… most preferred, 8… last preferred).

Stimuli	**Distance**		**Recommend-ation**	**Waiting Time**		**Quality Information (Infection Rate)**		**Innovat-iveness**
1	Far	1.5 h	Not recommend.	Short	2 months	Low	1.8%	Low
2	Close	30 min	Not recommend.	Long	6 months	Low	1.8%	Low
3	Close	30 min	Recommended	Short	2 months	Low	1.8%	High
4	Close	30 min	Recommended	Long	6 months	High	4.7%	Low
5	Close	30 min	Not recommend.	Short	2 months	High	4.7%	High
6	Far	1.5 h	Recommended	Long	6 months	Low	1.8%	High
7	Far	1.5 h	Not recommend.	Long	6 months	High	4.7%	High
8	Far	1.5 h	Recommended	Short	2 months	High	4.7%	Low

All participants performed the constant sum scale task and provided information to be used as control variables:

Constant Sum Scale
What is the role of the single criteria for you when choosing a hospital? Please distribute of a total of 100% to all criteria.

- Distance: x %
- Recommendation: x %
- Waiting time: x %
- Quality information: x %
- Innovativeness: x %
- Total = 100 %

Control question: Are there any other relevant criteria not mentioned here?
Control variables:

- Please rate your perceived health status: 1… very poor 2… poor 3… fair 4… good 5… very good
- Gender: male, female
- Age: in years
- Educational level: intermediate, A-level, academic degree